

REMARKS

Favorable reconsideration and withdrawal of the objection and rejections set forth in the above-mentioned Official Action in view of the foregoing amendments and the following remarks are respectfully requested.

Specification

The specification has been amended to place it in better form. It is respectfully submitted that no new matter has been added.

Claims Status

Claims 1 through 5 and 8 through 14 are now pending in the application. Claims 6 and 7 have been canceled. Claims 1, 5, and 8 have been amended to even more succinctly define the invention and/or to improve their form. Claims 9 through 14 have been added to accord Applicants an additional scope of protection commensurate with the disclosure. It is respectfully submitted that no new matter has been added. Claims 1 and 9 are the only independent claims pending in the application.

Claim Objections

Claim 1 is objected to because of the presence of a minor informality. In response, Claim 1 has been amended *inter alia* by adopting the Examiner's suggestion for overcoming the objection.

Allowable Subject Matter

It is acknowledged with appreciation that Claim 5 is merely objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claims and any intervening claims. Claim

5 remains in its dependent form, inasmuch as it is believed that Claim 1 from which it depends will be found to be allowable.

Art Rejections

Claims 1, 2, 3, and 8 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,456,802 (Phillips) in view of U.S. Patent No. 5,450,177 (Oyama).

Claim 4 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Phillips in view of Oyama and further in view of U.S. Patent No. 6,668,141 (Kojima, et al.).

Claim 6 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Phillips in view of Oyama and further in view of U.S. Patent No. 6,459,861 (Sakurai, et al.).

Claim 7 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Phillips in view of Oyama and further in view of U.S. Patent No. 6,687,467 (Katoh).

The rationale underlying each of the foregoing art rejection is succinctly set forth in the Official Action.

Response to Art Rejections

The rejections are respectfully traversed.

Amended independent Claim 1 calls for a toner residual amount detection apparatus that includes a developing device for developing an electrostatic image formed on an image bearing member by a toner. The developing device is provided on and movable with respect to an apparatus main body. A sensor outputs information corresponding to a toner residual amount in the developing device. A judging means compares an output of the sensor with a reference value to thereby judge a toner residual amount. The judging means judges that the toner residual amount is insufficient when a number of times that the output of the sensor is less than the reference value within a predetermined detection time exceeds

a reference number of times. Image forming is inhibited after a predetermined number of times of image forming after the toner residual amount is judged to be insufficient. A changing means changes the reference number of times to a smaller value when it is judged that the toner residual amount is insufficient.

Independent Claim 9 is similar to Claim 1 in calling for a developing device, a scanner, and a judging means. The judging means judges that the toner residual amount is insufficient when a rate with respect to an output from the sensor is less than the reference value exceeds a reference rate value. Image forming is inhibited after a predetermined number of times of image forming after the toner residual amount is judged to be insufficient. Claim 9 also calls for a changing means for changing the reference rate value to a smaller value when it is judged that the toner residual amount is insufficient.

The claimed invention is directed to preventing a problem of misjudging a “toner presence state” due to a change in toner distribution in a developer container due to movement of a developing device after it is judged that the toner residual amount is insufficient.

In order to solve the above-mentioned problem, the claimed invention calls for a feature of “changing the reference number of times (Claim 1) or the reference rate value (Claim 9) in judging the toner residual amount to a smaller value, when the judging means judges that the toner residual amount is insufficient”. By changing the reference number of times (Claim 1) or the reference rate value (Claim 9) to the smaller value, the claimed invention makes it more likely that it is judged that the toner residual amount is insufficient. Accordingly, the claimed invention prevents the judging means from

misjudging a “toner presence state”, even if the toner condition within the developer container changes due to movement of the developing device.

Phillips discloses a capacity determination for a toner or ink cartridge. In Phillips, in order to accurately estimate the toner residual amount even if the initial toner amount (or capacity) within the toner cartridge is unclear, (i) at the time when the toner sensor detects a “toner low level” condition, the estimated toner residual amount is compared with the toner residual amount estimated by pixel counting, and it is decided whether the estimated initial toner amount is accurate, and (ii) in accordance with the decision result, a weighting factor for pixel counting is changed to estimate the residual life of the cartridge.

The Examiner recognizes that Phillips does not teach changing a reference value to a smaller value when a judgment that the toner amount is not insufficient. Accordingly, the Examiner looks to Oyama for this feature.

Oyama discloses an image forming apparatus for controlling toner replenishment in a developing device employing a two-component developer in accordance with a detection result of a toner concentration sensor 11 disposed within a developing device. The density of a reference toner image on a photosensitive drum 1 is sensed by the sensor 11. A reference value VR of a toner concentration sensor 10 is changed in accordance with the detection result of the sensor 11, in order to stabilize a toner concentration control. Oyama judges that the image concentration is high (or dark) when the output of the sensor 11 is less than 0.1, and then shifts the control reference value VR to a smaller value so that the toner concentration in the developing device becomes low (or light).

The Examiner argues that it would be obvious to modify Phillips to include the feature of changing a reference value used in judging of the toner residual amount to a

smaller value, when the judging means judges that the toner residual amount is insufficient as suggested by Oyama. Applicants respectfully disagree.

It is noted that the claimed invention detects a toner residual amount. In contrast, Oyama detects and controls toner concentration. Accordingly, even if the teachings of Oyama were combined with the teachings of Phillips, the combination would not result in the claimed invention.

Sakurai, et al. is cited in combination with Phillips and Oyama in rejecting dependent Claim 6, which is now canceled. Sakurai, et al. merely discloses an image forming apparatus in which (i) the toner residual amount is detected by a toner residual amount detection means (electrode 9), and (ii) when the toner residual amount becomes equal to or less than M(g), the number of remaining printable sheets number is calculated.

Katoh is cited in combination with Phillips and Oyama in rejecting dependent Claim 7, which is now canceled. Katoh merely discloses an apparatus for controlling a supply of developer, wherein a primary rate being sensed during a step of an output sampling from a printing rate detector. In Katoh (i) a pixel rate with respect to a driving time of the developing device is calculated, and (ii) when such a calculated result becomes less than 2.0, “a Black-Bar” is formed between the sheets (or in the sheet interval).

It is respectfully submitted that Sakurai, et al. and Katoh do not remedy the above-noted deficiencies of Phillips and Oyama *vis-á-vis* the claimed invention.

Further, it is respectfully submitted that the cited art does not disclose or suggest a feature of a judging means, which judges that the toner residual amount is insufficient when a number of times that the output of said sensor is less than the reference value

within a predetermined detection time exceeds a reference number of times to a smaller value when it is judged that the toner residual amount is insufficient as recited in Claim 1; or a feature of “the judging means, which judges that the toner residual amount is insufficient, when a rate with respect to an output of said sensor is less than the reference value exceeds a reference rate value and a changing means, which changes the reference rate value to a smaller value when it is judged that the toner residual amount is insufficient as recited in Claim 9.

It is also respectfully submitted that the combination rejections are not well founded. The Examiner has provided a *rationalization* for combining the teachings of the cited art based on the benefits of doing so. A combination rejection is proper only when there is some suggestion or motivation in the cited art *per se* to cause one having ordinary skill in the art to combine the teachings of the cited art. There is nothing in the cited art which supports the position that it can be combined in the manner suggested. Even if the art could be so combined, the mere fact that the art can be combined is not sufficient if there is no suggestions in the art that such a combination is desirable. For example, see ACS Hospital Systems, Inc. v. Montefiore Hospital, 221 U.S.P.Q. 929, 933 (Fed. Cir. 1984). If the Examiner chooses to maintain the foregoing combination rejections, he is kindly requested to show such motivation to establish a *prima facie* case of obviousness.

In view of the foregoing, it is respectfully submitted that amended Claim 1 is allowable over the cited art whether taken individually or in combination.

Newly Presented Independent Claim 9

Claim 9 calls for a developing device, a sensor, and judging means as recited in amended Claim 1. According to Claim 9, the judging means judges that the toner residual

amount is insufficient when a rate with respect to an output from the sensor is less than a reference value exceeds a reference rate value. Image forming is inhibited after a predetermined number of times of image forming after the toner residual amount is judged to be insufficient. A changing means changes the reference rate value to a smaller value when it is judged that the toner residual amount is insufficient.

It is respectfully submitted that Claim 9 also is allowable over the art of record.

Dependent Claims

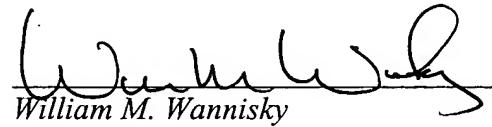
Claims 2 through 5 and 10 through 14 depend either directly or indirectly from one of Claims 1 and 9 and are allowable by virtue of their dependency and in their own right for further defining Applicants' invention. Individual consideration of the dependent claims is respectfully requested.

Closing Comments

It is respectfully submitted that the claims on file are allowable over the art of record and that the application is in condition for allowance. Favorable reconsideration and early passage to issue of the present application are earnestly solicited.

Applicants' undersigned attorney may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should continue to be directed to our New York office at the address shown below.

Respectfully submitted,



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